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COGNITIVE COMPLEXITY AND CONCEPT LEARNING
OF PAINTING STYLES

by

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A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Cognitive Complexity and Concept Learning of Painting Styles", submitted by Kenneth Anthony Hill in partial fulfillment of the requirements for the degree of Master of Arts.

Abstract

This study explored the relationship between cognitive complexity (Harvey, Hunt, & Schroder, 1961) and the ability to classify abstract and representational paintings according to artists, with length of exposure time as an additional variable of interest.

Thirty-two cognitively simple and 32 cognitively complex subjects (_S_s) were chosen for the experiment on the basis of their scores on Tuckman's Individual Topical Inventory. A concept learning paradigm was used in which _S_s were exposed to five paintings in each of five sets, each painting in a set painted by a different artist, and asked to match each painting with the correct artist. Feedback was given as to the accuracy of responses and the number of correct responses were assessed over a series of five test trials.

Data analysis revealed that _S_s demonstrated concept learning over the test trials, with significant linear and cubic trends. Although a prediction that cognitively complex _S_s would perform better than cognitively simple _S_s was not confirmed, all other predictions were supported. Complex _S_s demonstrated significantly superior performance to simple _S_s on representational art, but not on abstract art. Cognitively simple _S_s performed better than complex _S_s with abstract art at the longer exposure rate. Despite the decline in performance with longer exposure to abstract art, complex _S_s showed significant improvement when classifying representational painting during longer exposures. Exposure rate made no difference to simple _S_s when classifying abstract art, with some increase in

success with longer exposures to representational art.

The results were explained in terms of salience and relevance of information available in the two types of art, and the relative abilities and dispositions to use that information by persons differing in cognitive complexity. Specifically, it was suggested that the most salient cues in representational art (i.e., content) are not necessarily the most relevant to categorizing by painter, and require a more complex structure on the part of the viewer. On the other hand, salience and relevance are highly correlated in abstract art, and the tendency toward early closure by persons cognitively simple prevents information search beyond the most relevant cues. However, extensive information search leads cognitively complex persons to classify erroneously when viewing abstract art at relatively long exposure rates, because they attend to less salient and relevant cues.

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Introduction

Research in the psychology of art has frequently been characterized by attempts to correlate particular personality variables with preferences in art stimuli, with the purpose of suggesting the nature of the esthetic experiences for various "types" of individuals (e.g., Child, 1965). Although such research is important to the field of personality and art, it is handicapped by the tentativeness of its strictly correlative data and its reliance upon individual preferences as an index of the experience of art stimuli. This thesis attempted to traverse some theoretical and methodological ground in the areas of individual differences in cognitive complexity and the perception of art. Specifically, art stimuli was used in a concept learning paradigm as a behavioral measure of differential sensitivity to painting styles by individuals varying in cognitive complexity. Of particular interest was the question of whether persons more cognitively complex generally perform better on such tasks than cognitively simple persons, or if there exist certain conditions where such expectations are not justified.

Cognitive Complexity and Conceptual Systems Theory

Recent interest in individual differences in the complexity of cognitive structure probably received its greatest impetus from Kelly's theory of personal constructs (Kelly, 1955). Kelly defined a personal construct as a dimension used in construing one's social environment. The dimensions composing a system of personal constructs

are the characteristic modes of perceiving persons; thus, a "dimension" is any scale perceived to be relevant by a person making a particular judgment, and the degree to which one stimulus can be discriminated from another increases as the number of perceived dimensions increases. The school of cognitive theorists most influenced by Kelly's work therefore equates cognitive complexity with the "dimensional" complexity of cognitive structure (Bieri, 1955, 1961, 1968; Bieri, Atkins, Briar, Lobeck, Miller, & Tripodi, 1966). More specifically:

> Cognitive complexity may be defined as the capacity to construe social behavior in a multi-dimensional way. A more cognitively complex person has available a more differentiated system of dimensions for perceiving others' behavior than does a less cognitively complex individual (Bieri et al., 1966).

Kelly's research utilized his Role Construct Repertory Test (Rep Test), which was designed to elicit an individual's system of role constructs. While the original form of the Rep Test has been modified (Bieri et al., 1966), the basic procedure still involves judging a number of persons on a series of construct dimensions, with the purpose of analyzing how an individual construes the ways in which other persons are alike and different from each other. Although the concept of dimensional complexity has been successfully generalized to the perception of ink blots (Bieri & Blacker, 1956), household items (Hess, 1966) and values (Higgins, reported in Bieri, 1961), the bulk of attention has been focused upon person perception, including social judgments (Bieri, 1955; Rosenkrantz, & Crockett, 1965; Meltzer, Crockett, & Rosenkrantz, 1966; LeCann, 1969) and

impression change (Leventhal, 1957; Leventhal & Singer, 1964; Mayo & Crockett, 1964).

The inquiry into cognitive structure presented in conceptual systems theory (Harvey, Hunt, & Schroder, 1961; Schroder, Driver, & Streufert, 1967) also reflects Kelly's influence and is kindred to the research in dimensional complexity described above. Because both trends of inquiry are frequently carried out under the rubic of "cognitive complexity", the fact that there are important distinctions between them is not commonly appreciated. Conceptual systems theory has attempted not only to incorporate a broader range of human behavior than person perception, but it has also been more ambitious in its model of the relationship between cognitive and environmental complexity and behavior.

As in Bieri's (1961, 1968) concept of cognitive complexity, conceptual systems theory maintains that there are important individual differences in cognitive differentiation of stimulus variables, i.e., some persons have at their disposal more perceived dimensions to consider in making a judgment or decision, forming an attitude, etc. More importantly, however, there also exist differences in the integrative complexity of the rules in which dimensions are separated and recombined in formulating these decisions and judgments. Low integration imples a form of cognitive rigidity in which rules are relatively fixed and schemata for organizing alternate sets of rules are absent. On the other hand:

> High integration index structures have more connections between rules; that is, they have more schemata for forming new

> hierarchies, which are generated as alternate perceptions or further rules for comparing outcomes. High integration structures contain more degrees of freedom, and are more subject to change as complex changes occur in the environment (Schroder et al., 1967, p. 7).

Therefore, a fundamental distinction between dimensional complexity and integrative complexity should be evident. A person may be dimensionally complex (i.e., perceive many dimensions in a stimulus object) yet unable to integrate or combine these dimensions in a flexible manner. On the other hand, Schroder et al. and Vannoy (1966) have suggested that integratively complex persons are probably dimensionally complex as well, although the relationship is not inevitable. This distinction may indeed explain why Bieri's test for dimensional complexity and the Sentence Completion Test (SC) for integrative complexity constructed by Schroder and Streufert (1962) are not well correlated (Vannoy, 1965).

The SC is a projective test which attempts to measure the degree of integrative complexity of subjects (*S*s) by requiring them to write conclusions to stems which imply "interpersonal conflict, ambiguity, or the imposition of control" (Tuckman, 1966). Each completion is scored by a trained rater, such that the *S* may be classified according to one of four levels of cognitive complexity ranging from concrete (level 1) to abstract (level 4). These levels, therefore, are meant to reflect the integrative complexity of the cognitive structures of those *S*s classified within them.

Common concrete responses to these stems (e.g., "When I am criticized...") generally reflect (a) overgeneralization of response,

(b) absoluteness of response, (c) inability to view a situation from another person's point of view, (d) inability to generate alternate perceptions and outcomes, (e) tendency to seek structure and to avoid delay of closure (Schroder et al., 1967). On the other hand, the person who scores at the highest level of integrative complexity perceives "a diverse world filled with many alternatives,"...and generates "a large variety of alternative interpretations of environmental events and can thus react to the subtleties of his environment with appropriate and novel responses" (Tuckman, 1966). The perceptual aspect of the distinction between integratively simple and complex persons may be illustrated by a study by Bryson and Driver (1969), which provided support for the hypothesis that integratively complex persons are more sensitive to the nuances of the environment. Complex Ss were more aroused by complex polygons that simple Ss, as monitored by a GSR. The behavioral aspect of the distinction between complex and simple persons can be found in a study of creativity by Tuckman (1966), who devised an objectively-scored variation of the SC (the ITI, discussed below) and demonstrated that both tests were quite successful in predicting performances by Ss classified as concrete or abstract on a "creative test battery." Abstract (i.e., complex) Ss scored significantly higher on these instruments, indicating more flexibility and originality.

In an experiment involving decision making, Sieber and Lanzetta (1964) used a tachistoscope to expose abstract and concrete Ss to slides varying in uncertainty (i.e., meaningfulness of stimulus

figures). Ss were allowed as many presentations of a given slide as they desired before choosing to identify it. Some important findings were: (a) Abstract persons searched for more information and spent more time in processing it than did concrete persons; (b) Abstract persons were more likely than concrete persons to indicate doubt and uncertainty in their decisions; (c) Information search and processing by abstract persons increased more with increasing uncertainty than did search and processing by concrete persons. Considering this last finding, Schroder et al. (1967) wrote:

> Since abstract individuals produce many integrations of the information given, and also require further information in order to examine the feasibility of each decision, the complexity of their decision processes should increase rapidly with increases in information input (in this case, with greater ambiguity of the figures). The concrete person's tendency to structure a stimulus field and to reduce the degrees of freedom available precludes much of this activity (p. 114).

Streufert, Suedfeld and Driver (1965) further investigated the relationship between information "load" and conceptual level. It was found that for simple (i.e., concrete) Ss, integrative information processing broke down completely when the amount of available information became excessive. While complex Ss also declined in performance under high levels of information load, they still processed much more information than simple Ss. In an experiment utilizing a simulated decision making environment, Streufert and Schroder (1965) found that their complex Ss were more integrative at all levels of information load. Summarizing their data, they remarked that structurally complex persons responded in an

integrated, strategic fashion, while simple persons responded more directly to immediate environmental information.

Suedfeld (1966) suggested that the emphasis on "bits" of stimuli as units of information may be a hindrance to the information processing model in which conceptual systems theory is formulated. He maintained that the informative value of stimuli is largely a function of the context in which it is perceived. To test this hypothesis, he constructed two series of words differing in "pattern complexity", i.e., all the words in a given series were responses to an original stimulus word, but the series differed in frequency of associations with that word. Thus, one series (the complex pattern) required more integrative complexity of clues on the part of Ss to discover the original stimulus word. Also, the rate of exposure was varied, such that a 2 X 2 factorial design resulted (conceptual level was not a factor). Suedfeld found that, not only did the complexity of informational pattern interact with rate, but the long exposure to simple patterns resulted in inferior performance when compared to a similar exposure rate to complex patterns. In view of this finding, he suggested the possibility that Ss were paying attention to irrelevant information in the long-exposure condition during simple tasks, thus decreasing their problem-solving efficiency. An important implication is that integrative complexity may not always be conducive to superior performance on cognitive tasks.

This implication received further elaboration from Schroder et al. (1967) with regard to conceptual levels. These writers

explained that tasks requiring the processing of large amounts of information which must be integrated into a flexible, comprehensive system are more suited to persons functioning at a high level of integrative complexity. On the other hand, if the stimuli are complex but do not require a great deal of integration, persons of a lower level of complexity are expected to be more successful in reaching decisions. In this sort of task, only the most salient aspects of the stimuli are relevant. Because persons of high complexity are not likely to track the most salient information in such an area, they will be at a disadvantage. This hypothesis is supported by an earlier study by Tuckman (1964) involving group decisions in a stock market game, in which increased tracking of complex information was a function of increasing integrative complexity of group members. However, when success at the task required only that Ss track a comparatively simple source of information from among a complex stimulus array, there was a general trend indicating progressively increasing success with decreasing integrative complexity.

Cognitive Complexity and Concept Learning of Painting Styles

In an experiment designed to assess the influence of integrative complexity on concept identification (i.e., the ability to identify a category of objects or stimuli predetermined by the experimenter), Schneider and Giambra (1971) varied the available information and required Ss to seek new information in order to identify the correct concept. They found support for the hypothesis

that complex Ss are more efficient in obtaining relevant information and make fewer errors in concept identification. However, a replication study reported in the same paper yielded ambiguous results. The authors speculated that, during high information load, the complex Ss may have found themselves in the position of having too many perceived alternatives with which to cope, thus inhibiting their performance. For the purpose of this thesis, it is appropriate to add that Schneider and Giambra's paradigm allowed for "complete control over the dimensional extent of the stimulus universe and of the components of the universe", in an attempt to "exactly specify and actively control the alternate formulations of that universe, that is, the possible rules for connecting the components of the stimulus universe" (p. 262).

It is here considered unfortunate that conceptual systems theory has yet to find its interface with the current interest in decision-making models of concept learning (i.e., when examples of the concept need only be recognized, without the concept being explicitly identified), which stress the roles of hypotheses and strategies (e.g., Bruner, Goodnow, & Austin, 1956). The major characteristic of theories which emphasize strategies is that the essential characteristics of successful concept learning are not under the direct control of stimuli in the environment, but rather by subjective variables like "hunches" and personal estimates of success with various strategies. Particularly with studies using "natural stimuli" (i.e., pictures of real rather than artificial stimulus objects), when usually neither the experimenter nor the

subject can identify the relevant dimensions following successful concept learning, these theories smack of "intuition" and present difficult quantification problems with stimulus variables. However, in all of the studies discussed under conceptual systems theory, efforts were made to identify and manipulate the relevant dimensions of "information", in order that the experimenters could receive data from their subjects as to the relationship between "objectively" defined information and cognitive processes.

It is felt that this state of affairs is not a necessary one. On the contrary, individual differences in cognitive functioning may contribute valuable information to concept learning research. There is nothing which precludes a linkage between the information-processing model of conceptual systems theory and the most intuitive of approaches to concept learning. All that is needed is a reorientation of theoretical concerns away from stimulus contingencies and toward the individual in a more natural environment. While specificity is lost, a more comprehensive perspective of human behavior is gained.

Recent research in sensitivity to painting styles (Gardner, 1970a, 1970b, 1971; Walk, 1967; Walk, Karusaitis, Lebowitz, Falbo, 1971; Tighe, 1968), while not always executed under the rubric of concept learning, provides an excellent opportunity to measure the weight of conceptual structure in complex cognitive tasks resembling those occurring in natural settings. Before it is explained how this opportunity will be exploited in this thesis, a description of the research in this area will be presented.

"Style" was defined by Gardner (1970a) as "those qualities of line, texture, and composition which characterize a range of works by the same artist and which remain discernible regardless of subject, dominant colors, size or medium." Sensitivity to style is thus "the ability to make classifications which isolate objects or individuals possessing sundry properties from those that have different characteristics." Although Gardner did not acknowledge the similarities between his research and concurrent studies in concept learning in art (Walk, 1967; Walk et al., 1971; Tighe, 1968), his definition of sensitivity to style clearly places his work in concept learning context.

Gardner operationalized sensitivity to painting style as the subject's ability to choose an additional example of a painter's work from an array, once he had been exposed to a number of examples. Interested in the development of style sensitivity, he found that adolescents were more able to classify paintings according to artists than younger children, who tended to group paintings according to subject matter (Gardner, 1970a). In a following report (Gardner, 1970b), he found that by inverting representational paintings, he could induce six-grade children to attend to style in their groupings, while first-grade children persisted to classify the subject matter. Gardner suggested that the younger children were fixed upon specific perceptual cues and unable to classify according to the more abstract cues of harmony, composition or overall expressiveness.

In an original and innovative paper, Walk (1967) articulated

the applicability of a concept learning model to the learning of painting styles. While traditional studies in concept learning utilize simple concepts (e.g., "two-ness"), and it is the task of the subject to "discover" the correct concept, an artist's painting style represents a concept which can only be defined by the experimenter (E) as an example of that concept. In this paradigm, S is not expected to learn well enough from the positive instances to be perfectly accurate in applying the "concept" to new instances. The value of using stimuli as complex as art objects to study concept learning, as Tighe (1968) recognized, is that it "provides a model for investigating the development of those numerous daily life concepts which lack objective defining criteria."

In his first experiment, Walk (1967) exposed Ss to six examples of the work of six different painters and asked them to pair each artist's name with his paintings. Ss in the experimental group were informed of the correctness of their judgments, while control Ss were not. Definite concept learning was demonstrated. Experimental-group Ss increased their accuracy from the first set of six paintings to the sixth set from 23% to 43%. Control-group Ss did not significantly improve their accuracy. In a developmental study, Walk (1971) found that successful classification by children of paintings was a function of chronological age and that the ability to classify correctly "out-stripped" correct verbalization of concepts (e.g., Picasso as "strange", Seurat as "foggy").

Tighe (1968) used a somewhat similar procedure to Walk's (1967), but whereas Walk used painters representing the impressionistic

school, Tighe selected cubist paintings for study as being presumably lower in "meaningfulness". His reason for using this more abstract form of art was that it would constitute a more rigorous test of the technique. Tighe's Ss also did quite well: the percentage of correct classifications from the first test trial to the fifth rose from 17% to 60%. In a post-experimental interview, Ss indicated that they relied upon stylistic features rather than upon content cues, and that they tended to differentiate the pictures in terms of global impressions rather than through the detection of specific features. In view of the relatively brief time in which Ss were exposed to each painting (five seconds), it is conceivable that global impressions were the only kinds of impressions Ss had time to form.

Statement of the Problem

Conceptual systems theory, as an information-processing model of cognitive structure, assumes important individual differences in the ability of persons to differentiate environmental stimuli and to integrate this information into conceptual rules for organizing dimensional values. It has been demonstrated that persons classified as high in integrative complexity are disposed to seek as much information as possible, while integratively simple persons tend to respond more directly to immediate environmental information (e.g., to information which is most conspicuous and easily perceived) and seek early closure. This tendency to quick structure may be an asset when the most salient information in a complex stimulus array

is also the most relevant for problem solving. On the other hand, integratively complex persons are rarely satisfied with just the most salient information and often perceive too many alternatives in this type of problem to cope as well as integratively simple persons. When the relevant information is not the most salient, however, complex persons may indeed be expected to perform better than simple ones.

Conceptual level has been investigated in a concept identification context and there is some indication that complex Ss are able to perform this type of cognitive task better than simple Ss (Schneider & Giambra, 1971). However, the relative abilities of complex and simple persons to perform in "daily life" concept learning tasks (where the concept need not be identified but only recognized) has not been investigated. Recent studies applying the concept learning paradigm to the learning of painting styles provides an excellent opportunity to attempt such an investigation. It is felt that any knowledge obtained regarding the relationship between cognitive structure and the learning of painting styles may furnish valuable insights into both research areas.

Furthermore, a comparison of abstract and representational forms of paintings may reveal any differential effect of art form upon cognitive organization.[1] Considering the nature of the concept learning task, it is assumed that, in the case of abstract art, the most critical dimension for success in classifying by painter is the global one of form, which is a relatively salient aspect of an abstract painting. Therefore, during relatively long exposure times,

complex Ss may attend to increasingly minute and less relevant stimulus dimensions and demonstrate more difficulty in concept learning. Integratively simple Ss, however, should "track only the most salient information" and therefore perform relatively better than their more complex counterparts.

Compared to abstract art, content in representational art is potentially more relevant as well as salient, and while integratively simple Ss may be inclined to perceive content as well as form, they lack the integrative complexity to process the less salient features of content (e.g., subtleties in meaningfulness) and form (e.g., slight variations in the postures of Madonnas), particularly at short exposure times. A simple illustration is Walk's (1967) experiment with children, where the more salient aspects of content were purposely made as irrelevant as possible, and younger children responded almost strictly to content cues at the expense of more subtle stylistic features, therefore performing poorly on the task. Now, in the case of representational art, it is expected that, although simple Ss will indeed be responding to the more salient aspects of form, they will attend mainly to content cues, as these tend to be more salient in representational art. It is expected, therefore, that integratively simple Ss will have difficulty in grouping representational paintings by artists, particularly at short exposure times, because less salient aspects of these paintings must be taken into account (i.e., are relevant). As suggested above, content cues can be very helpful or very misleading, and the latter case should occur when the more salient

aspects of content are least relevant (e.g., dominant color, landscapes vs. portraits, etc.). Simple Ss should respond to only the more salient features of content and form in the case of representational art, and are expected to be additionally encumbered when the more salient features of content are irrelevant. However, complex Ss, attending also to the less salient and more relevant features of content and form in representational art, are not expected to demonstrate as much difficulty in classifying paintings by artists, particularly at longer exposure rates.

In the case of abstract art, it is expected that complex Ss will be more adept than simple Ss at processing the salient information at the short exposure rate (as is also the case with representational art), but with longer exposure rates they will attend to irrelevant aspects of abstract paintings and thereby decline in performance. On the other hand, simple Ss, because they tend to utilize only salient information and incline toward early closure, should improve their performance only slightly with longer exposure rates, but thereby demonstrating some superiority over complex Ss on the categorizing task. Despite this latter expectation, complex Ss will probably exhibit an overall superiority to simple Ss in categorizing abstract paintings, as their decline in performance at long exposure rates may be more than compensated for by their relative superiority at short rates. However, the superiority of complex Ss at categorizing representational paintings should be much more marked.

In view of the above discussion, the following hypotheses are

proposed:

1. (a) Cognitively complex Ss will demonstrate superior overall learning of painting styles on both abstract and representational art.

   (b) The differences between conceptual levels will be greater for representational art than abstract art (i.e., an art-type X cognitive complexity interaction).

2. There will be a significant art-type X cognitive complexity X exposure rate interaction. Complex Ss will demonstrate sensitivity to painters of representational art in superior fashion over longer exposure rates, while performing in an inferior fashion with abstract art. Exposure rate will make little difference for simple Ss exposed to abstract art, with some increase in success for representational art.

Method

Overview

Male and female Ss were selected for this experiment who scored at the extremes of the Individual Topical Inventory, which assesses conceptual level. Ss were exposed individually to prints of either abstract or representational paintings, one print at a time. A concept learning paradigm was used in which Ss were required to learn the painting styles of the particular five artists represented in their condition. The time of exposure, as well as the type of art, was varied. Afterwards, Ss were questioned orally regarding any cues or strategies they may have used during the experiment.

Test Materials, Subjects and Apparatus

Ten artists representing two types of art (abstract and representational) were selected. Page-size prints of paintings were acquired from art books and mounted on white matte-board. Included in the representational art condition were Titian, Raphael, Mantegna, Botticelli, and El Greco. The abstract artists chosen were Kandinsky, Miró, Klee, Gorky, and Pollack. The representational paintings were roughly matched for content: portraits of men by each artist, portraits of women, Madonnas, Christs, and paintings of elder saints or bishops. Each of these five categories made up a set, with one painting by each of the five artists included in each set. The abstract paintings were matched for dominant colors. The purpose of

matching was to eliminate as much as possible any consistencies due to content or color for any individual painter which would unduly simplify the categorizing task.

Tuckman's Interpersonal Topical Inventory (ITI, Tuckman, 1966; see Appendix A) was used to assess the integrative complexity of approximately 300 introductory psychology students at the University of Alberta during mass testing. The ITI has demonstrated its utility as an adequate instrument for identifying level one (integratively simple) and level four (integratively complex) persons (Tuckman, 1966, 1967; Hewitt & Rule, 1968; Sandilands, 1969; MacNeil, 1969; Hewitt, 1970). Of the total number of Ss tested, 32 cognitively simple (system one) and 32 cognitively complex (system four) persons were selected to participate in the study. Proportions of men and women are equalized for both levels of complexity. Most Ss received experimental credit for their participation; however, difficulties in acquiring Ss with this form of compensation necessitated paying one S in each condition $2.00 for the experimental hour.

A motor-operated device for exposing prints to Ss for precise periods of time (2.5 and 12.5 seconds) was constructed. Paintings revolved horizontally and were exposed at a predetermined rate by a tachistoscope. It was devised in such a manner as to enable the experimenter to change paintings easily while keeping score of Ss' responses.

Procedure

Ss were informed they were participating in a learning experiment, with art prints as stimuli. No mention of conceptual level

was made at any time during or following the experiment. The instructions, which were read orally to Ss, appear in Appendix B.

Each S was exposed to each set of paintings as five paired-associate learning tasks and required to associate the artists' names with their works. Ss were seated five feet from the viewing apparatus, and each set of prints was presented three times in the following manner:

First presentation: test trial. Each print was presented for a specific period of time (depending upon the particular exposure rate condition S was assigned to) and S was asked to guess the name of the artist and inform E of his choice. The names of all the artists were supplied by E and were readily available to S (the names were attached to the viewing apparatus several inches above the exposure window). No information as to correctness of choice was given to S on the first trial.

Second presentation: training trial. Each painting was exposed for the same length of time while E gave the name of the artist simultaneously. S was not required to respond on the second trial.

Third presentation: training trial. Each painting was presented at the same exposure rate and S again had to tell E his choice. E then either affirmed S's response (if it was correct) or indicated the correct artist.

The orders in which sets were exposed to Ss were counterbalanced, such that no one set appeared in the same position (relative to the four other sets) more than once in any condition. Also,

the orders of paintings within sets were randomized for each S.

Finally, Ss were queried following the experiment regarding any strategies and sorts of clues they may have used during the experiment. Also, information about Ss' background in art was recorded.

Results

The experiment yielded a 2 X 2 X 2 X 2 factorial, repeated measures design, including two levels of cognitive complexity, two art-type conditions, two rates of exposure to the art stimuli, and two sexes. Table 1 reports the mean correct associations per trial for each cell.

An analysis of variance was performed on the average number of correct associations for the five test trials, and is summarized in Appendix C.[2] For the purpose of performing a series of orthogonal comparisons on cell means, the relatively small number of Ss per cell was doubled by collapsing the sex variable in a second analysis of variance of the same data. The minor influence of the sex factor, when considered as part of the error term, did not result in any changes in conclusions or of significance levels involved, nor did the sex factor have any bearing upon the hypotheses. (The second ANOVA table is also contained in Appendix C.) A second matrix of means, with sex not considered as a factor, appears in Table 2. This table will be useful only regarding the discussion of orthogonal comparisons. For the remainder of this discussion, all references to statistical analysis of data will be based on the first ANOVA, i.e., with the sex variable considered, except for those involving orthogonal comparisons.

As expected, a main effect for trials was highly significant ($F = 10.26$, $p < .001$, $df = 4,192$). This finding indicated that Ss consistently demonstrated differential degrees of success over the

Table 1

Mean Correct Associations Per Trial
With Sex as a Factor

		Representational Art		Abstract Art	
		2.5 secs.	12.5 secs.	2.5 secs.	12.5 secs.
I's	M	1.25	1.30	2.30	1.45
	F	1.00	1.90	1.60	2.40
IV's	M	1.15	2.00	1.70	1.15
	F	1.70	2.20	2.15	1.35

Table 2

Mean Correct Associations Per Trial
Without Sex as a Factor

	Representational Art		Abstract Art	
	2.5 secs.	12.5 secs.	2.5 secs.	12.5 secs.
I's	1.125	1.600	1.950	1.925
IV's	1.425	2.100	1.925	1.250

five successive trials. A trend analysis revealed a very significant positive linear trend ($F = 35.62$, $p < .001$, $df = 1,192$) as well as a significant overall cubic trend ($F = 5.09$, $p < .05$, $df = 1,192$). The main effect for trials is graphed in Figure 1.

Hypothesis 1a, in which an overall main effect for conceptual level was predicted, was not supported by this analysis. However, the expected interaction between conceptual level and art-type predicted in Hypothesis 1b was supported ($F = 5.59$, $p < .05$, $df = 1,48$). This interaction is graphed in Figure 2. As was predicted, orthogonal comparisons on cell means revealed that system four Ss demonstrated significantly superior performance compared to system one Ss on representational art ($t = 1.72$, $p < .05$, one-tailed, $df = 1,56$). System one Ss were slightly superior to system four Ss on abstract art, but the difference did not quite reach an acceptable level of significance ($t = 1.51$, $p < .10$, one-tailed, $df = 1,56$). (See Appendix D for summary of orthogonal comparisons.)

Hypothesis 2, in which a significant conceptual level X art-type X exposure rate interaction was predicted, was not supported by the analysis of variance. However, orthogonal comparisons were more successful in describing the relationships of these variables. System four Ss were significantly more successful at classifying representational paintings during long exposure rates than short ones ($t = 2.05$, $p < .025$, one-tailed, $df = 1,56$). On the other hand, as predicted, system four Ss demonstrated less successful performance with long exposure rates compared to short rates when viewing abstract art ($t = 2.05$, $p < .025$, one-tailed, $df = 1,56$). Furthermore,

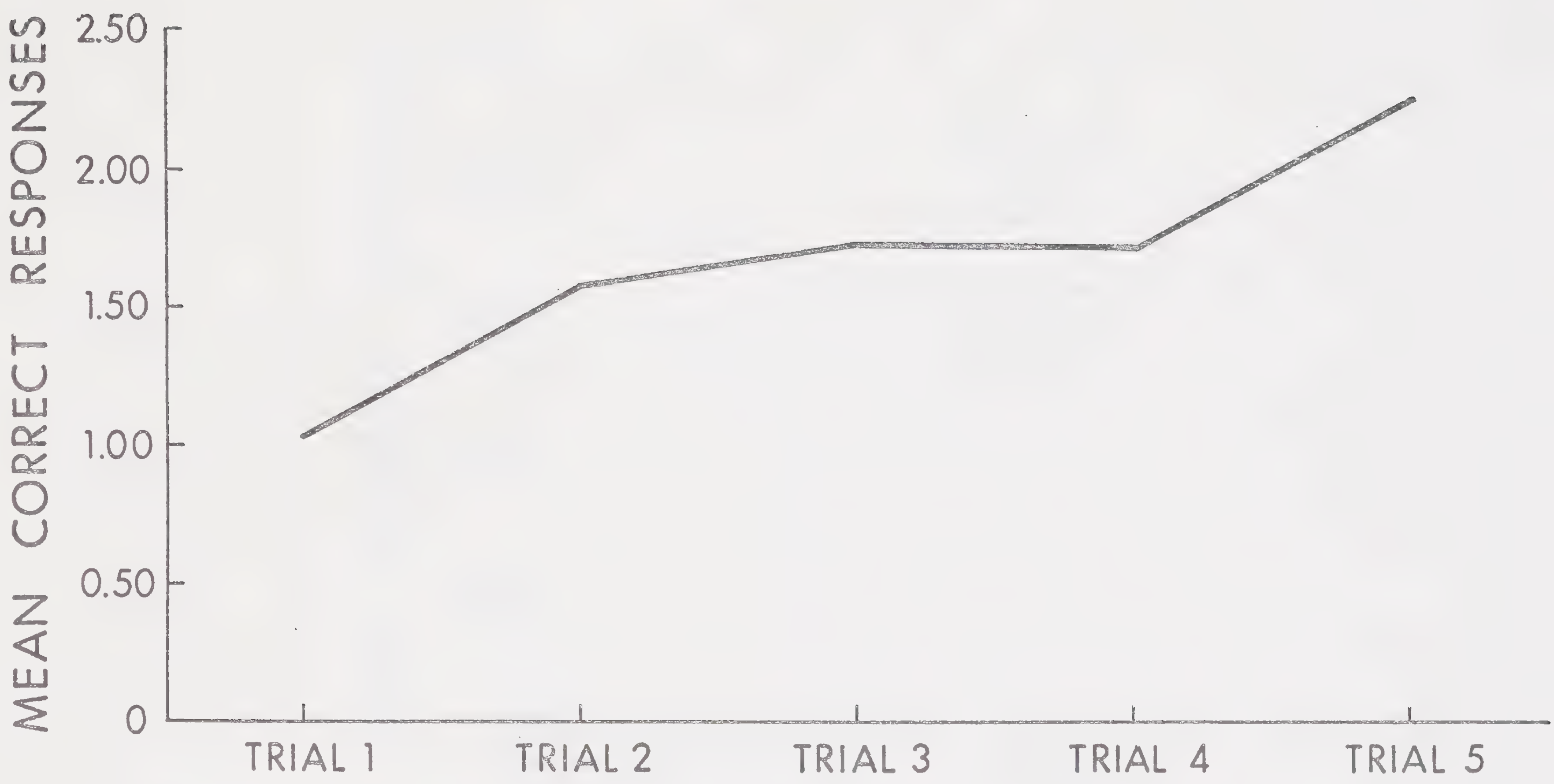

Figure 1: Trials

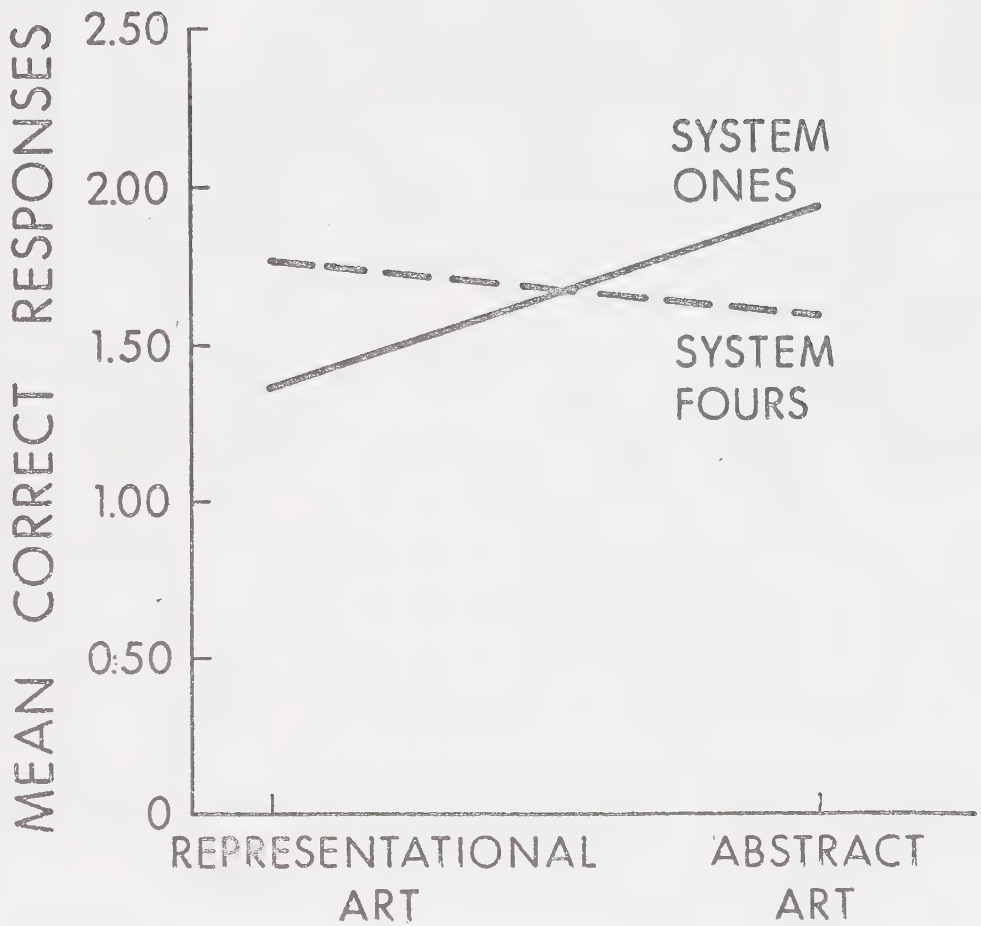

Figure 2: Mean Correct Responses for Conceptual Level and Art-Type Conditions

exposure rate made almost no difference for system one Ss when classifying abstract art ($t = .76$, n.s.), while there was some increase in success with the longer exposure rate to representational art by system one Ss, although not quite significant ($t = 1.44$, $p < .10$, one-tailed, $df = 1,56$). Both of these latter findings are also consistent with predictions.

The analysis of variance revealed a significant art-type X exposure rate interaction ($F = 8.49$, $p < .01$, $df = 1,48$). Representational art was better classified when Ss had longer exposures to it, whereas performance on abstract art tended to be superior at shorter exposure rates. However, an examination of Figure 3 reveals that the art-type X exposure rate interaction is almost entirely determined by the effects of conceptual level, and, as such, is strictly a function of the conceptual level X art-type X exposure rate interaction discussed above. The art-type X exposure rate interaction is graphed in Figure 4.

In addition, a significant but unexpected three-way interaction resulted between the factors of conceptual level, exposure rate and sex ($F = 5.96$, $p < .05$, $df = 1,48$). This interaction is graphed in Figure 5. System one females were more successful with longer exposure rates than short rates, while male ones did better at shorter rates. This relationship was reversed for system four Ss, although the differences were not as dramatic as with the system one Ss. Thus, system four males and females demonstrated more homogeneity on the dependent variable within similar exposure rate conditions than did system one males and females. An explanation

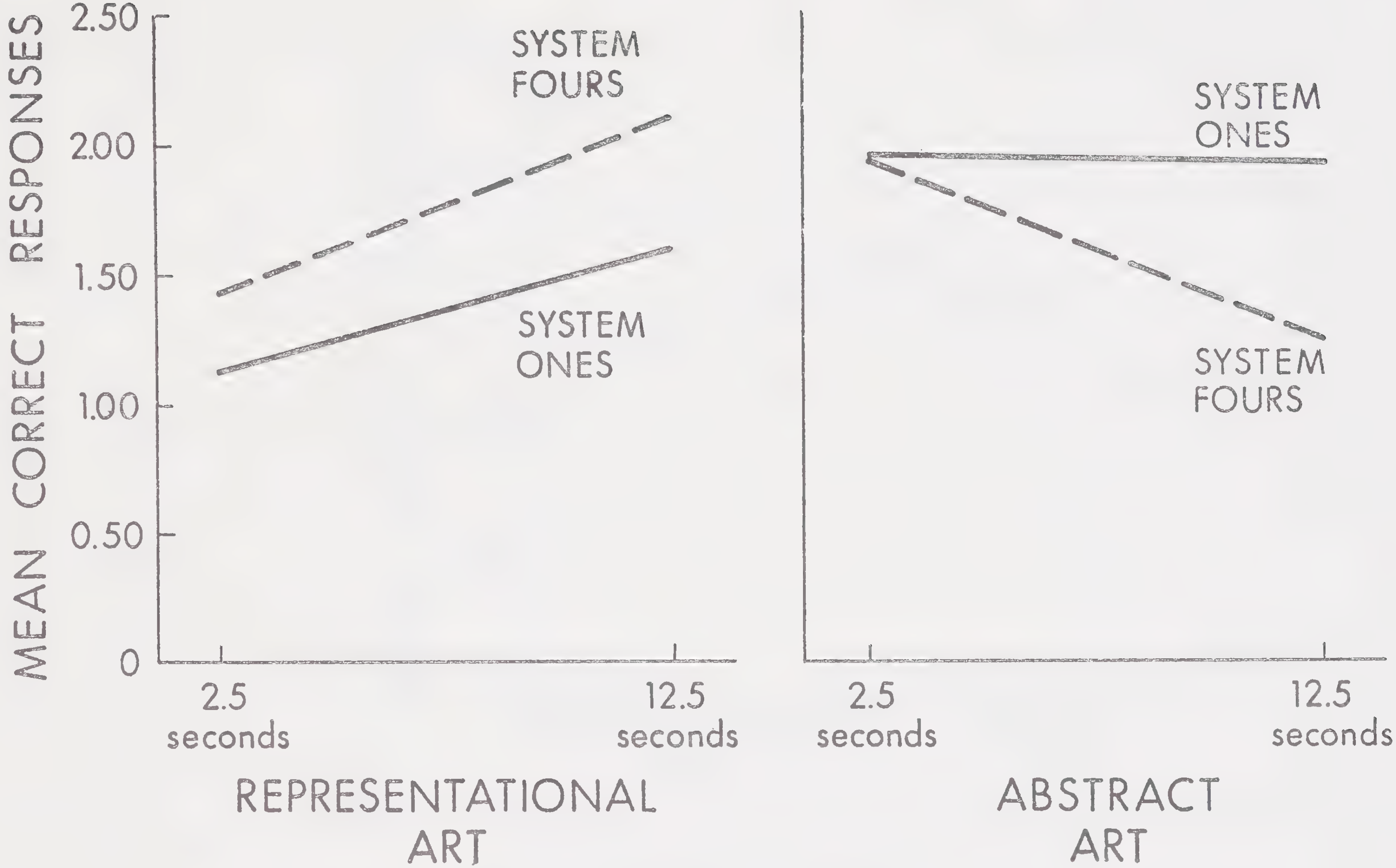

Figure 3: Mean Correct Responses for Conceptual Level, Art-Type and Exposure Rate Conditions

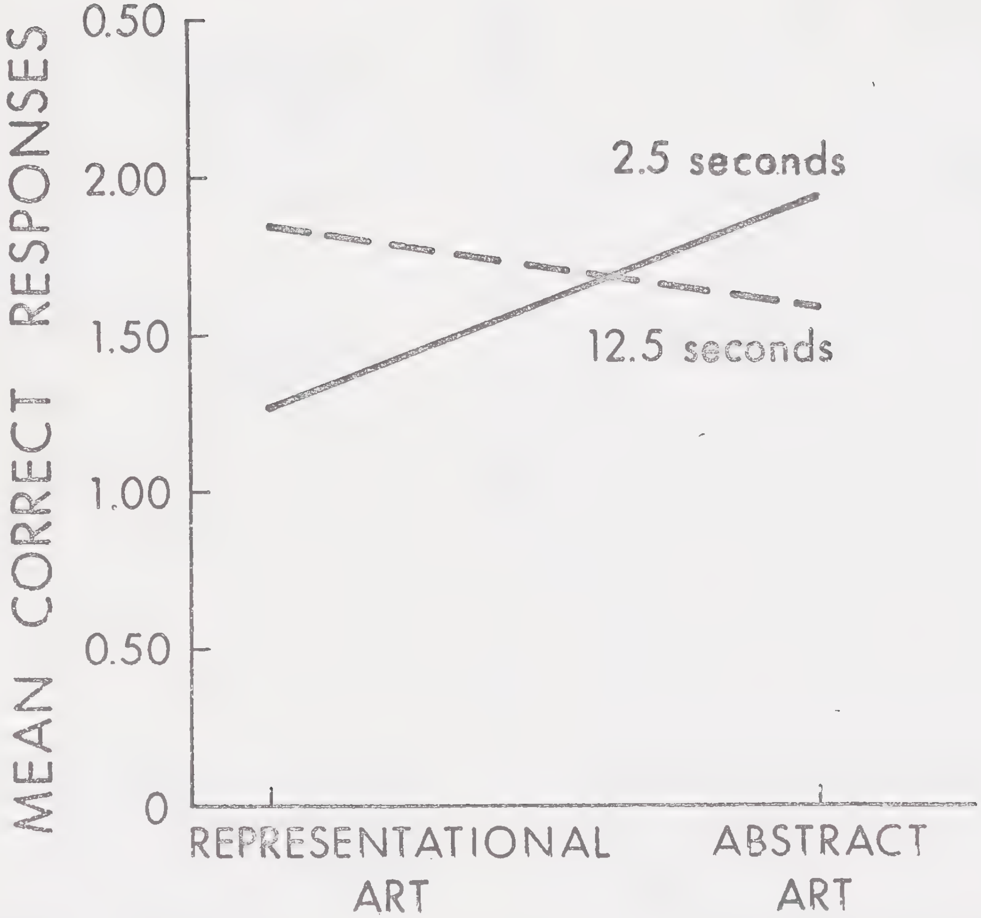

Figure 4: Mean Correct Responses for Art-Type and Exposure Rate Conditions

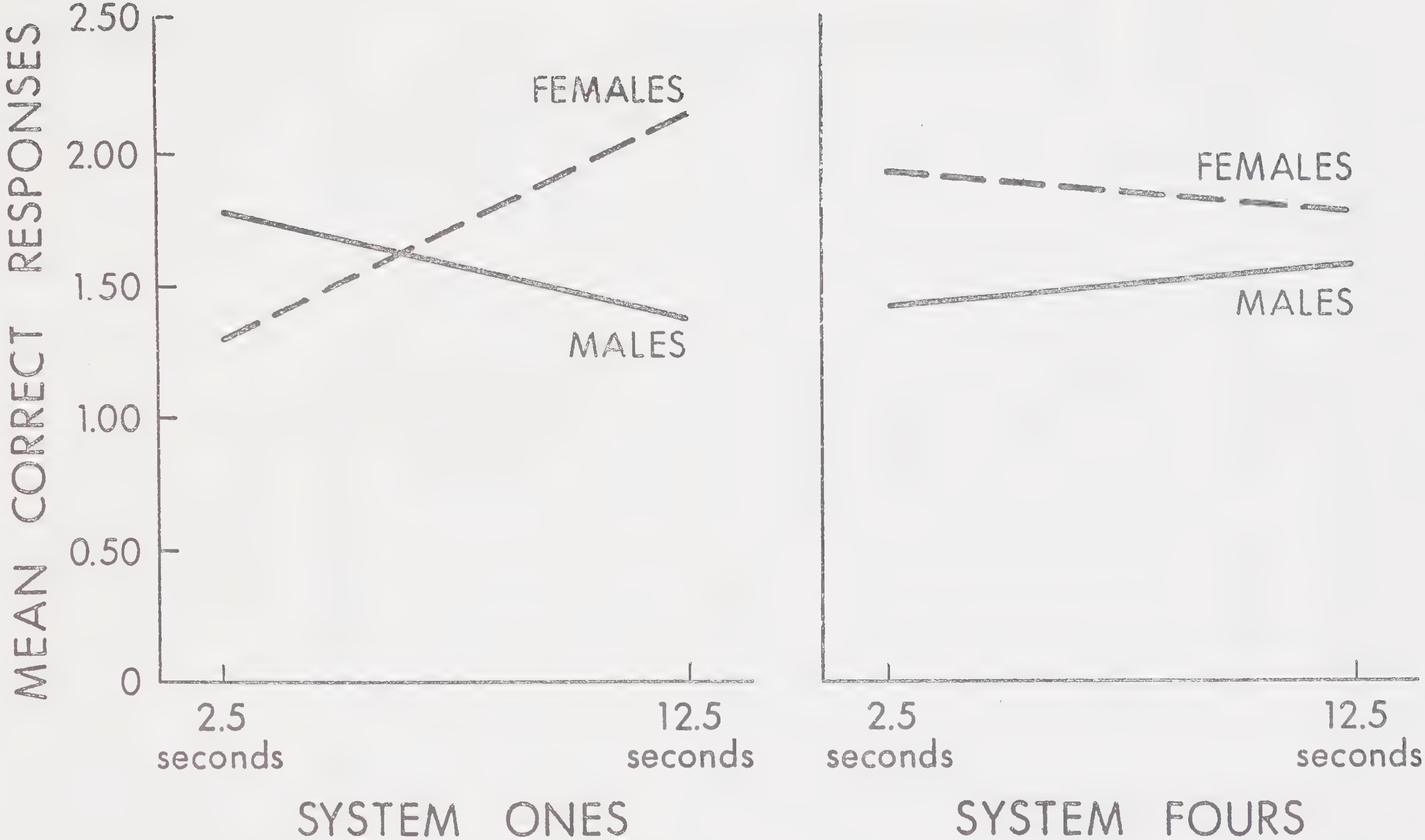

Figure 5: Mean Correct Responses for Conceptual Level, Exposure Rate and Sex Conditions

for this phenomenon is not readily available and may warrant future investigation for those interested in sex differences in cognitive complexity. However, it will not be discussed further in this thesis.

Main effects for sex, art-type, and exposure rate were all non-significant.

Regarding post-experimental queries on strategies and clues _Ss_ may have tried to use, it was discovered that few _Ss_ could well articulate or describe the individual styles of the different painters. This was true even for many _Ss_ who demonstrated success on the categorizing task. There was a tendency for _Ss_ who were more successful at categorizing paintings to use more subjective descriptions of the paintings they saw (e.g., "weird", "confusing", "unreal"), while _Ss_ who did less well preferred descriptions more objective, e.g., the brightness of color or the straightness of line. Whether this observation can simply be attributed to richer vocabularies in the more successful _Ss_, or whether it may suggest important differences in styles of perceiving the art stimuli, can only be determined by further, more systematic inquiry.

No important differences in art background were discovered among _Ss_. Most _Ss_ had very little or no experience with art.

Discussion

In this thesis it was proposed that persons of high integrative complexity are generally more successful at learning the painting styles of individual artists, particularly when exposed to representational types of paintings. On the other hand, it was expected that the criterion for successful performance in classifying abstract paintings is relatively simple, and that if integratively complex persons are given sufficient time they will handicap themselves by attending to irrelevant aspects of this form of art (e.g., look for expressive styles in line or color that are more accidental than stylistic, while neglecting the more salient and relevant aspects of form). However, it was expected that system one _S_s, because of their relatively low integrative complexity and proclivity toward closure, are more successful with abstract paintings than representational ones, particularly at a relatively short exposure rate.

The experiment supported all but one hypothesis to some degree. Hypothesis 1a, in which a significant main effect for conceptual level was predicted, was the exception. Although system four _S_s performed significantly better than system one _S_s with representational art (as was predicted in Hypothesis 1b), system one _S_s were slightly more successful than system four _S_s with abstract art, thereby preventing the main effect for conceptual level. The significant conceptual level X art-type interaction proved to be one of the more interesting findings in the study, as it suggests differential cognitive abilities for system one and four _S_s,

depending upon the stimuli perceived.

Hypothesis 2 was partly supported by the experimental results. Although the conceptual level X art-type X exposure rate interaction was not statistically significant in the analysis of variance, further analysis revealed that some of the expectations connected with this prediction were confirmed. System four Ss demonstrated more success with representational paintings at long exposure rates than brief ones, and more success at brief exposure rates than long rates when viewing abstract art. This finding supports the important assumption that the structure of the abstract paintings used in this study is such that persons with high integrative complexity can best perceive them (for classifying purposes) at relatively brief rates. This finding contrasts with the performance of Ss of low integrative complexity, in which exposure rate made little difference while classifying abstract paintings. System one Ss also did better with representational art at longer exposure rates than short rates, but the difference was non-significant. For system one Ss, it may be that the relatively complex nature of the representational paintings used in this study required a longer exposure rate for successful classification than was allowed.

A significant main effect for trials, together with a significant positive linear trend, reveals that Ss demonstrated concept learning and serves as a replication of the studies by Walk (1967) and Tighe (1968). However, a significant cubic trend supplements the results of earlier studies by indicating that the learning process was not exactly linear: Ss tended to improve their performance

most on the second and last trials, with less learning occurring on third and fourth trials. Whether this result can be generalized beyond the particular stimuli and methods used in this study cannot be determined until further research is done in this area.

An important assumption of this study, one which is also pertinent to the general area of concept learning and art, is that salience and relevance vary with the level of abstraction of the art stimuli. This study has supported a proposition that the more salient aspects of abstract art are also the more relevant to successful classification by artist, and attending to less salient features of this form of art may lead to a decline in that ability to classify. Obviously, more research with this assumption is necessary before it can be accepted confidently. Therefore, some suggestions for further work will be proposed.

A primary suggestion is to use both short and long exposure rates for the same subjects, with only art-type and conceptual level as between-subjects variables. The advantage of this design should be apparent, as a repetition of learning rates similar to those encountered in this study would lend considerable support to the assumption that long exposures to abstract art are detrimental to the classifying ability of integratively complex persons. A subsidiary study would be to correlate preferences for art-type with conceptual level. This could conceivably rule out an alternative explanation that complex persons simply prefer representational paintings to abstract, and that an absence of interest in the latter caused a lack of attention at longer exposure rates, thereby

decreasing performance.

Also, more exposure rates may be included in order to better assess the reliability of the differential classification performances noted in this study. Linear trends in learning rates over exposure times in directions similar to the results in this study would provide considerable support to the assumptions contained herein. Finally, it may be desirable to improve the post-experimental questioning in order to better discover the nature of impressions that representational and abstract types of art (particularly the latter) made upon _S_s (i.e., global vs. specific features) at various exposure rates. For example, if system four _S_s do indeed become more analytic with increased exposure, their verbalizations may reveal an increased attention to detail in abstract art, which can then be compared to their performance on the classification task.

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Footnotes

[1]Discussions of abstract art in this thesis will refer specifically to the school of modern "abstract expressionism", with which the five artists used in this study as "abstract" painters are often identified. This focus serves to prevent a confusion with other so-called abstract painters (e.g., cubists) whose aesthetic theories and styles are somewhat inconsistent with the use of abstract discussed above.

[2]The interactions by trials with other factors has been purposely omitted from the summary appearing in Appendix C. Although analyses were performed, the results shed no light on the hypotheses in question nor supplied interpretable information.

APPENDICES

APPENDIX A

INDIVIDUAL - TOPICAL INVENTORY

(Form A)

INSTRUCTIONS

You will be given some situations and topics to which we would like you to respond. The responses are given in pairs. You are to choose one response from each pair. Choose the response that most closely fits your opinion or feeling and indicate your choice by blackening "A" or "B" corresponding to the response chosen. Always choose one member of each pair. Never choose both members of the pair and do not skip over any of the pairs. If you agree with both, choose the one you agree with most strongly. If you do not agree with either, choose the one you find the least disagreeable of the two.

Example:

Here is an example of the way the questions will be asked and the way they should be answered. The manner in which you will indicate your choice between the two given responses is illustrated below:

When I am confused...

Pair No.

(i)	
A	B
I try to find a solution and end the confusion.	I completely ignore the fact that I am confused.

(ii)	
A	B
I break out into a nervous sweat.	I remain calm at all times.

How to respond:

First: Decide which response you agree with most.

Second: Indicate which response you agree with most by blackening in the identifying letter on the IBM sheet. Thus, if in comparing the

first pair of statements, you agree with the statement, "I try to find a solution and end the confusion", more than with the statement, "I completely ignore the fact that I am confused", you would black in the letter "A" (above the chosen statement). Having chosen one (never both, never neither) statement from the first pair of statements, you would then move on to the second pair. If, in considering the second pair, you find that you agree more with the statement, "I remain calm at all times", (as compared to the statement, "I break out into a nervous sweat") you would black in the letter "B" on the IBM sheet.

On the pages that follow there are 36 different pairs of responses. There are six pairs on a page. You are to select one response from each pair, the one that more accurately shows your opinion or feeling and record your choice by blackening in the letter indicating the statement chosen. Be frank and indicate, in each case, your true feeling or opinion or the reaction which you actually would make in the situation. Do <u>not</u> indicate how you <u>should</u> feel or act; rather, indicate how you <u>do</u> feel and act.

Make sure that you are aware of the situation or topic that each pair of responses refers to. You will find the situation or topic identified at the top of each page. All items on the page refer to the situation or topic appearing at the top of that page.

When you are finished, your paper should contain 36 marks. Check back and make sure that you have made 36 choices, no more or less.

Remember: (1) Respond only once for each pair; that is, choose <u>one</u> member of the pair, never both, never neither. Indicate your choice by blackening in either "A" or "B".

(2) When you are finished you should have made 36 marks.

Work at your own rate of speed but work straight through the inventory without stopping. Once you have completed a page do not return to it.

YOU MAY BEGIN

1. Imagine that someone has criticized you. Choose the response from each pair that comes closest to your feelings about such criticism. Indicate your choice by blackening in either "A" or "B" on the IBM sheet.

When I am criticized...

Pair No.	A	B
(1)	I try to take the criticism, think about it, and value it for what it is worth. Unjustified criticism is as helpful as justified criticism in discovering what other people's standards are.	I try to accept the criticism but often find that it is not justified. People are too quick to criticize something because it doesn't fit their standards.
(2)	I try to determine whether I was right or wrong. I examine my behavior to see if it was abnormal. Criticism usually indicates that I have acted badly and tends to make me aware of my own bad points.	It could possibly be that there is some misunderstanding about something I did or said. After we both explain our viewpoints, we can probably reach some sort of compromise.
(3)	I listen to what the person says and try to accept it. At any rate, I will compare it to my own way of thinking and try to understand what it means.	I feel that either I'm not right, or the person who is criticizing is not right. I have a talk with that person to see what's right or wrong.

(4)

A	B
I usually do not take it with good homor. Although, at times, constructive criticism is very good, I don't always think that the criticizer knows what he is talking about.	At first I feel that it is unfair and that I know what I am doing, but later I realize that the person criticizing me was right and I am thankful for his advice. I realize that he is just trying to better my actions.

(5)

A	B
I try to ask myself what advantages this viewpoint has over mine. Sometimes both views have their advantages and it is better to combine them. Criticism usually helps me to learn better ways of dealing with others.	I am very thankful. Often I can't see my own errors because I am too engrossed in my work at the time. An outsider can judge and help me correct the errors. Criticism in everyday life usually hurts my feelings, but I know it is for my own good.

(6)

A	B
It often has little or no effect on me. I don't mind constructive criticism too much, but I dislike destructive criticism. Destructive criticism should be ignored.	I try to accept and consider the criticism. Sometimes it has caused me to change myself; at other times I have felt that the criticism didn't really make much sense.

2. Imagine that you are in doubt. Choose the response from each pair that comes closest to your feelings about such doubt. Indicate your choice by blackening either "A" or "B" on IBM sheet.

When I am in doubt...

Pair No.

(7)

A	B
I become uncomfortable. Doubt can cause confusion and make one do a poor job. When one is in doubt he should ask and be sure of himself.	I find myself wanting to remove the doubt, but this often takes time. I may ask for help or advice if I feel that my questions won't bother the other person.

(8)

A	B
I don't get too upset about it. I don't like to ask someone else unless I have to. It's better to discover the correct answer on your own.	I usually go to someone who knows the correct answer to my question. Sometimes I go to a book which will set me straight by removing the doubt.

(9)

A	B
I first try to reason things out and check over the facts. Often I approach others to get ideas that will provide a solution.	I think things over, ask questions, and see what I can come up with. Often several answers are reasonable and it may be difficult to settle on one.

(10)

A	B
I realize that I'll have to decide on the correct answer on my own. Others try to be helpful, but often do not give me the right advice. I like to judge for myself.	I usually try to find out what others think, especially my friends. They may not know the answer, but they often give me some good ideas.

(11)

A	B
I look over the problem and try to see why there is a doubt. I try to figure things out. Sometimes I just have to wait awhile for an answer to come to me.	I try to get some definite information as soon as possible. Doubt can be bad if it lasts too long. It's better to be sure of yourself.

(12)

A	B
I consider what is best in the given situation. Although one should not rush himself when in doubt, he should certainly try to discover the right answer.	I act according to the situation. Sometimes, doubt can be more serious than at other times and many of our serious doubts must go unanswered.

3. Imagine that a friend has acted differently toward you. Choose the response from each pair that comes closest to your feelings about such an action. Indicate your choice by blackening either "A" or "B" on the IBM sheet.

When a friend acts differently towards me...

Pair No.

(13)

A	B
I am not terribly surprised because people can act in many different ways. We are different people and I can't expect to understand all his reasons for acting in different ways.	I am usually somewhat surprised but it doesn't bother me very much. I usually act the way I feel towards others. People worry too much about others' actions and reactions.

(14)

A	B
I find out why. If I have done something wrong I will try to straighten out the situation. If I think he's wrong, I expect him to clear things up.	I feel that I may have caused him to act in a different way. Of course, he may have other reasons for acting differently which would come out in time.

(15)

A	B
I first wonder what the trouble is. I try to look at it from his viewpoint and see if I might be doing something to make him act differently toward me.	It is probably because he has had a bad day, which would explain this different behavior; in other cases he may just be a changeable kind of person.

(16)

A	B
It is probably just because something is bothering him. I might try to cheer him up or help him out. If these things didn't work I would just wait for him to get over it.	I try to understand what his different actions mean. I can learn more about my friend if I try to figure out why he does things. Sometimes the reasons may not be very clear.

(17)

A	B
There has to be a definite reason. I try to find out this reason, and then act accordingly. If I'm right I'll let him know it. If he's wrong, he should apologize.	I usually let him go his way and I go mine. If a friend wants to act differently that's his business, but it's my business if I don't want to be around when he's that way.

(18)

A	B
I don't get excited. People change and this may cause differences. It is important to have friends, but you can't expect them to always be the same.	I like to get things back to normal as soon as possible. It isn't right for friends to have differences between them. Whoever is at fault should straighten himself out.

4. Think about the topic of people in general. Choose the response from each pair that comes closest to your thoughts about people. Indicate your choice by blackening either "A" or "B" on IBM sheet.

This I believe about people...

Pair No.

(19)

A	B
Whatever differences may exist between persons, they can usually get along if they really want to. Although their ideas may not agree, they probably still have something in common.	People can learn from those who have different ideas. Other people usually have some information or have had some experience which is interesting and can add to one's knowledge.

(20)

A	B
People can act in all sorts of ways. No single way is always best, although at certain times a particular action might be wiser than others.	Each person should be able to decide the correct thing for himself. There are always a few choices to be made and the individual himself is in the best position to pick the right one.

(21)

A	B
Some people think they know what's best for others and try to give advice. These people shouldn't make suggestions unless asked for help.	There are certain definite ways in which people should act. Some don't know what the standards are and therefore need to be straightened out.

(22)

A	B
I can tell if I am going to get along with a person very soon after meeting him. Most people act either one way or another and usually it is not difficult to say what they are like.	It's hard for me to say what a person is like until I've known him a long time. People are not easy to understand and often act in unpredictable ways.

(23)

A	B
People have an outside appearance that usually isn't anything like what can be found on the inside, if you search long and hard enough.	Each person is an individual. Although some people have more good or bad points than others, no one has the right to change them.

(24)

A	B
People can be put into categories on the basis of what they're really like. Knowing the way a person really is helps you to get along with him better.	People are unlike one another in many respects. You can get along with people better and better understand them if you are aware of the differences.

5. Think about the general topic of leaders. Choose the response from each pair that comes closest to your thoughts about leaders. Indicate your choice by blackening either "A" or "B" on IBM sheet.

Leaders...

Pair No.

(25)

A	B
Leaders do not always make the right decisions. In such cases, it is wise for a man to look out for his own welfare.	Leaders are necessary in all cases. If a leader cannot make the right decisions another should be found who can.

(26)

A	B
Leaders cannot provide all the answers. They are like other people--they have to try to figure out what action is necessary and learn from their mistakes.	Leaders make decisions sometimes without being sure of themselves. We should try to understand this and think of ways to help them out.

(27)

A	B
I like a leader who is aware of how the group feels about things. Such a leader would not lead any two groups in exactly the same way.	A person should be able to put his confidence in a leader and feel that the leader can make the right decision in a different situation.

(28)

A	B
Some leaders are good, others are quite poor. Good leaders are those who know what is right for the men under them. These leaders deserve the respect of every man.	Leaders cannot be judged easily. Many things go to make up good leadership. Most people fall short in some way or another, but that is to be expected.

(29)

A	B
There are times when a leader shouldn't make decisions for those under him. The leader has the power to decide things, but each man has certain rights also.	A leader should give those under him some opportunity to make decisions, when possible. At times the leader is not the best judge of a situation and should be willing to accept what others have to say.

(30)

A	B
Leaders are needed more at certain times than at others. Even though people can work out many of their own problems, a leader can sometimes give valuable advice.	Some people need leaders to make their decisions. I prefer to be an individual and decide for myself, when possible. Most leaders won't let you do this.

6. Imagine that someone has found fault with you. Choose the response from each pair that comes closest to your feelings about such a situation. Indicate your choice by blackening either "A" or "B" on IBM sheet.

When other people find fault with me...

Pair No.	
(31)	
A	B
It means that someone dislikes something I'm doing. People who find fault with others are not always correct. Each person has his own ideas about what's right.	It means that someone has noticed something and feels he must speak out. It may be that we don't agree about a certain thing. Although we both have our own ideas, we can talk about it.
(32)	
A	B
I first wonder if they are serious and why they have found fault with me. I then try to consider what they've said and make changes if it will help.	If enough people point out the same fault, there must be something to it. I try to rid myself of the fault, especially if the criticizers are people "in-the-know".
(33)	
A	B
They have noticed something about me of which I am not aware. Although criticism may be hard to take, it is often helpful.	They are telling me something they feel is correct. Often they may have a good point which can help me in my own thinking. At least it's worthwhile to consider it.

(34)

A	B
I may accept what is said or I may not. It depends upon who is pointing out the fault. Sometimes its best to just stay out of sight.	I accept what is said if it is worthwhile, but sometimes I don't feel like changing anything. I usually question the person.

(35)

A	B
I like to find out what it means; since people are different from one another, it could mean almost anything. A few people just like to find fault with others but there's usually something to be learned.	There is something to be changed. Either I am doing something wrong or else they don't like what I'm doing. Whoever is at fault should be informed so that the situation can be set straight.

(36)

A	B
I don't mind if their remarks are meant to be helpful, but there are too many people who find fault just to give you a hard time.	It often means that they're trying to be disagreeable. People get this way when they've had a bad day. I try to examine their remarks in terms of what's behind them.

CHECK AND MAKE SURE THAT YOU'VE CHOSEN ONE MEMBER OF EACH PAIR

(A TOTAL OF 36 MARKS)

INDIVIDUAL TOPICAL INVENTORY SCORING KEY

	SYSTEM			SYSTEM	
Pair No.	A	B	Pair No.	A	B
1.	3	2	19.	3	4
2.	1	4	20.	4	2
3.	3	1	21.	2	1
4.	2	1	22.	1	4
5.	4	3	23.	3	2
6.	2	4	24.	1	3
7.	1	3	25.	2	1
8.	2	1	26.	4	3
9.	3	4	27.	3	1
10.	2	3	28.	2	4
11.	4	1	29.	1	4
12.	2	4	30.	3	2
13.	4	2	31.	2	4
14.	1	3	32.	3	1
15.	3	2	33.	3	4
16.	3	4	34.	1	2
17.	1	2	35.	4	1
18.	4	1	36.	2	3

NORMS FOR THE ITI*

Decile	System 1	2	3	4
10	11	13	13	15
9	10	12	12	14
8	9	11	12	14
7	8	10	11	12
6	8	9	10	12

<u>System scoring</u>. If a <u>S</u> scores 9th or 10th decile in one system and 8th or lower in all others, classify him in his highest system. <u>Ss</u> who score 8th decile in one system and 6th or lower in all others may also be classified in their highest scoring system.

*The norms are based on 387 first-year psychology students at the University of Alberta (1968-69).

APPENDIX B

INSTRUCTIONS

In this experiment I am going to show you a series of paintings and ask you to identify the artists who painted each painting. However, I will be helping you in two ways. First, I will supply the names of all five artists who did the paintings in order to eliminate much of the guesswork on your part. Second, I will inform you if your choices are correct or incorrect. If you incorrectly match a painting with the name of an artist, I will tell you the correct artist's name.

Each of the five artists painted five of the paintings I am going to show you. Therefore, a total of 25 paintings will be involved. I have grouped the paintings into five sets of five paintings, each by a different artist. We will work with one set of five paintings at a time, until we finish all five sets. While working with a particular set, I will expose each of the five paintings to you, one at a time. The first time we go through a set of paintings, I will ask you to match the name of an artist with the particular painting you are looking at. Then I will go through the same set again and tell you the correct artists for each of the five paintings in that set. Hopefully, this will improve your chances for identifying later paintings by these same artists. After going through a set of paintings twice, I will let you see the same set a third time and again ask you to identify the correct artists. This procedure will be the same for all five sets of paintings.

Are there any questions so far?

Remember that in each set of five paintings, each painting was painted by a different artist, such that all five artists are represented within each set. You are not expected to make a perfect score, so don't worry about giving me a particular artist's name more than once within a set.

These are the five artist's names we will be using. (Indicate to _S_ and read them aloud.) This list will be attached directly above the window where the paintings will be exposed. (Indicate)

Are you ready to begin?

(Seat _S_, cautioning him not to move the chair.)

APPENDIX C

SUMMARIES OF ANALYSES OF VARIANCE

A. Including Sex as a Factor:

Source	SS	df	MS	F	p
A: Conceptual Level	.05	1	.05	.025	
B: Art Type	3.20	1	3.20	1.588	
C: Exposure Rate	1.01	1	1.01	.503	
D: Sex	5.00	1	5.00	2.482	
A X B	11.25	1	11.25	5.584	.05
A X C	1.01	1	1.01	.503	
A X D	.80	1	.80	.397	
B X C	17.11	1	17.11	8.494	.01
B X D	.05	1	.05	.025	
C X D	4.51	1	4.51	2.24	
A X B X C	3.61	1	3.61	1.793	
A X B X D	.00	1	.00	.00	
A X C X D	12.01	1	12.01	5.963	.05
B X C X D	1.01	1	1.01	.503	
A X B X C X D	.61	1	.61	.304	
Error	96.70	48	2.01		
Trials	48.58	4	12.15	10.259	.001
Error	227.30	192	1.18		

B. Not Including Sex as a Factor:

Source	SS	df	MS	F	p
A: Conceptual Level	.05	1	.05	.023	
B: Art Type	3.20	1	3.20	1.485	
C: Exposure Rate	1.01	1	1.01	.470	
A X B	11.25	1	11.25	5.220	.05
A X C	1.01	1	1.01	.470	
B X C	17.11	1	17.11	7.940	.01
A X B X C	3.61	1	3.61	1.676	
Error	120.70	56	2.16		
Trials	48.58	4	12.15	10.046	.001
Error	270.80	224	1.21		

APPENDIX D

SUMMARY OF ORTHOGONAL COMPARISONS

									t^*	p^{**}
Cell Means	1.125	1.600	1.950	1.925	1.425	2.100	1.925	1.250		
Coefficients	-1	-1	0	0	1	1	0	0	1.72	.05
	0	0	0	0	-1	1	0	0	2.05	.025
	0	0	0	0	0	0	1	-1	2.05	.025
	-1	1	0	0	0	0	0	0	1.44	.10
	0	0	1	-1	0	0	0	0	.70	N.S.
	0	0	1	1	0	0	-1	-1	1.51	.10

* df = 1,56

** All tests are one-tailed.